

TABLE E-4
FRESHWATER SEDIMENT TOXICITY REFERENCE VALUES

Constituent	Surface Water Toxicity Reference Value (TRV) ^a	K _{oc} Value ^b	Bulk Sediment TRV (dry weight)	Reference and Explanation ^c
Dioxins and furans (Φg/kg)				
2,3,7,8-TCDD (compare to 2,3,7,8-TCDD toxicity equivalence concentration)	0.0000038	2,691,535	0.10	TRV was calculated using equilibrium partitioning (EqP) approach (U.S. EPA 1993), assuming a 1 percent organic carbon (OC) content. ^d
Polycyclic aromatic hydrocarbons (PAH) (Φg/kg)				
Total high molecular weight (HMW) PAH	Not applicable	Not applicable	170	TRV is effects range-low (ERL) value computed by Ingersoll and others (1996) based on 28-day amphipod (<i>Hyaella azteca</i>) toxicity tests. This TRV may be used if risk of total HMW PAHs is assessed.
Benzo(a)pyrene	Not applicable	Not applicable	84	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Benzo(a)anthracene	Not applicable	Not applicable	19	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Benzo(b)fluoranthene	Not applicable	Not applicable	37	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Benzo(k)fluoranthene	Not applicable	Not applicable	37	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Chrysene	Not applicable	Not applicable	30	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Dibenz(a,h)anthracene	Not applicable	Not applicable	10	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Indeno(1,2,3-cd)pyrene	Not applicable	Not applicable	30	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.

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Polychlorinated biphenyls (PCB) (Φg/kg)				
Aroclor 1016	Not applicable	Not applicable	50	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Aroclor 1254	Not applicable	Not applicable	50	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Nitroaromatics (Φg/kg)				
1,3-Dinitrobenzene	50	20.6	10.3	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
2,4-Dinitrotoluene	23	51	11.7	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
2,6-Dinitrotoluene	60	41.9	25.1	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Nitrobenzene	270	119	321.3	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Pentachloronitrobenzene	10	5,890	589	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
2,4,6-Trinitrotoluene (TNT)	90	25.1	22.6	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Phthalate esters (Φg/kg)				
Bis(2-ethylhexyl)phthalate	16	11,100	1776	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d

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Di-n-butyl phthalate	9.4	1570	147.6	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Diethyl phthalate	521	82	427.2	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Di(n)octyl phthalate	320	9.03 x 10 ⁸	2.9 x 10 ⁹	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Volatile organic compounds (Φg/kg)				
Acetone	100	0.951	0.951	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Acrylonitrile	260	2.22	5.8	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Bromoform	293	87.1	255.2	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Chloroform	124	53.0	65.7	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Crotonaldehyde	35	Not available	Not calculated	No TRV was calculated because no K _{oc} or K _{ow} values were identified for this constituent.
1,4-Dioxane	62,100	0.876	544	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Ethylbenzene	Not available	Not available	3,600	U.S. EPA Sediment Quality Benchmark (SQB) for freshwater sediments provided by U.S. EPA (1996). TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d

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Formaldehyde	49.6	26.2	13	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
n-Hexane	0.58	310	1.8	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
1,1,2,2-Tetrachloroethane	240	79.0	189.6	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Vinyl chloride	3,880	11.1	430.7	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Semi-volatile organic compounds (Φg/kg)				
Benzoic acid	Not applicable	Not applicable	650	Apparent Effects Threshold (AET) value for marine sediments is provided by Ginn and Pastorak (1992) and the Washington State Department of Ecology (WSDE 1995).
Benzyl alcohol	Not applicable	Not applicable	570	AET value for marine sediments is provided by Ginn and Pastorak (1992) and WSDE (1995).
Inorganics (mg/kg)				
Aluminum	Not applicable	Not applicable	14,000	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Antimony	Not applicable	Not applicable	64.0	TRV is an AET for <i>H. azteca</i> (WSDE 1994).
Arsenic	Not applicable	Not applicable	6.0	TRV is an LEL value (Persaud and others 1993).
Barium	Not applicable	Not applicable	20	TRV is a U.S. EPA Region 5 guideline value for classification of sediments for determining the suitability of dredged sediments for open water disposal, as cited in Hull and Suter II (1994).

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Beryllium	Not applicable	Not applicable	Not available	Regulatory or toxicity value not available.
Boron	Not applicable	Not applicable	Not available	Regulatory value or toxicity value not available.
Cadmium	Not applicable	Not applicable	0.6	TRV is an LEL value (Persaud and others 1993).
Chromium (total)	Not applicable	Not applicable	26	TRV is an LEL value (Persaud and others 1993).
Copper	Not applicable	Not applicable	16	TRV is an LEL value (Persaud and others 1993).
Total Cyanide	Not applicable	Not applicable	0.1	TRV is a U.S. EPA Region V guideline value for classification of sediments for determining the suitability of dredged sediments for open water disposal, as cited in Mabrey and Suter II (1994).
Lead	Not applicable	Not applicable	31	TRV is an LEL value (Persaud and others 1993).
Mercury	Not applicable	Not applicable	0.2	No toxicity data available for divalent inorganic mercury. Total mercury used as surrogate for divalent inorganic mercury. TRV is an LEL value (Persaud and others 1993).
Methylmercury	Not applicable	Not applicable	0.2	No toxicity data available for methylmercury. Total mercury used as surrogate for methylmercury. TRV is an LEL value (Persaud and others 1993).
Nickel	Not applicable	Not applicable	16	TRV is an LEL value (Persaud and others 1993).
Selenium	Not applicable	Not applicable	0.1	TRV is an AET for <i>H. azteca</i> (WSDE 1994).
Silver	Not applicable	Not applicable	4.5	TRV is an AET for <i>H. azteca</i> (WSDE 1994).
Thallium	Not applicable	Not applicable	Not available	Regulatory value or toxicity value not available.

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Zinc	Not applicable	Not applicable	110	TRV is an ERL value calculated by Ingersoll and others (1996) based on 28-day <i>H. azteca</i> toxicity tests.
Other compounds (Φg/kg)				
Cyclotrinitraminemethylene (RDX)	190	6.75	12.8	TRV was calculated using EqP approach (U.S. EPA 1993), assuming a 1 percent OC content. ^d
Decane	Not applicable	Not applicable	Not available	Regulatory value or toxicity value not available.
GB (Sarin)	Not applicable	Not applicable	Not available	Regulatory value or toxicity value not available.
VX	Not applicable	Not applicable	Not available	Regulatory value or toxicity value not available.
Sulfur mustard	Not applicable	Not applicable	Not available	Regulatory value or toxicity value not available.

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Notes:

- a Toxicity reference values are in units of micrograms per liter ($\mu\text{g/L}$) and milligrams per liter (mg/L) for organic and inorganic constituents, respectively.
 - b Values are in units of liters per kilogram (L/kg). K_{oc} = Organic carbon normalized sorption coefficient.
 - c The references refer to the study or studies from which the endpoint and concentrations were identified. Complete reference citations are provided at the end of this appendix.
 - d Sediment TRV was calculated with the following equation:
$$\text{Sediment TRV} = \text{Fresh water TRV} * K_{\text{oc}} * f_{\text{oc,bs}}$$

where,
 K_{oc} = organic carbon partition coefficient, and
 $f_{\text{oc,bs}}$ = fraction of organic carbon in bed sediment, assumed to be 1 percent = 0.01.
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